

YAMAHA XJ750RH SECA

Yamaha stuns the 750 class with a shaft-driven sports bike that has it all: high performance, new technology and a great blaze of flash.

• THOREAU'S INSIGHT ABOUT MEN HEARING a different drum seems valid to many people. To modern-day motorcycle manufacturers the concept has almost changed into an imperative dictum. Over the past 15 years the Japanese Big Four have created a fiercely competitive buyer's market. They are now too sophisticated to aim new models squarely at another manufacturer's product in the hope of knocking it from the sales charts; butting head-on in the sales arena like corporate billy goats generates headaches, not sales. Motorcycle manufacturers now try to shape their bikes subtly to fit specific niches within each displacement class.

The highly competitive 750cc class currently epitomizes this process. Suzuki, Kawasaki and Honda all offer excellent 45-inchers, each satisfying a slightly different need within the range of sport to sport-touring motorcycles. To crack such a tight market, Yamaha had to develop a 750 that was not only good, but also highly tailored; a bike that offered a little more of the same old thing might be largely ignored in the marketplace despite excellent performance.

Yamaha need not worry about anyone ignoring the XJ750RH or claiming it's run-of-the-mill; it's a bona fide sports bike with styling and functional innovations enough to stand out in the most stellar of motorcycle crowds.

The Seca's anti-dive suspension system can rightfully be called the most innovative feature on the 750. Although various forms of anti-dive arrangements have appeared on racing machines (See March 1981 *Cycle*), the Seca's is the first brake-controlled front fork compression damping system for street use on a production motorcycle.

An anti-dive system is desirable because a telescopic fork—for a couple of reasons—tends to bottom under braking loads. A bottomed suspension reduces ground clearance and transfers the force generated by the wheel hitting bumps directly to the chassis and rider. Traditionally, stiff springing—either air, coil springs or both—has compensated for this bottoming tendency. This method,



PHOTOGRAPHY: DAVE HAWKINS, ROBIN RIGGS



YAMAHA 750 SECA

however, is only a compromise; overly stiff springing sacrifices suspension compliance and therefore ride compliance. Also, conventionally designed dampers make the front end "pump down" over a series of bumps, which increases the tendency to bottom. "Pumping down" occurs because forks ordinarily have as much as five times more rebound damping than compression damping. When a bike is braking, the normal rebound bias of the dampers combines with the other forces compressing the fork and helps prohibit the springs from extending.

Yamaha's anti-dive suspension system prevents the front end from pumping down by increasing the fork's com-

pression damping (counteracting the rebound bias) when the front brake is applied. Hydraulic pressure in the front brake system activates a small spring-loaded valve that closes most of the compression damping oil circuit, thereby restricting flow and substantially increasing compression damping. This increase is designed to keep the front end from diving suddenly under braking. However, should the tire hit a sharp bump or hole during braking, the Seca's fork can still respond with "normal" damping characteristics thanks to a check-valve.

The anti-dive valve rests against a spring-loaded seat that opens when compression forces become high enough. Fork oil flows through the normal damping circuit when the seat has

opened, but as the bump smooths out, the seat closes and the fork once again continues to operate with the anti-dive valving restriction. If you wanted a normal fork to have this anti-dive capability, you'd have to design in entirely too much compression damping, which would make it too stiff. But Yamaha's anti-dive system doesn't impair overall ride quality because compression damping is increased only during braking. In fact, since the fork spring rates no longer have to be a compromise to resist braking loads, they can be softened to deal with road conditions only, and therefore comfort can be increased.

In actual practice, the Seca's anti-dive suspension system works quite well. The huge difference between

The Yamaha XJ750 has been sold in the USA for the past year or more and is now available in the UK. The sporting, lightweight four utilises a larger version of the XJ650 engine with shaft drive, plus anti-dive front forks and the Yamaha Induction Control System.

Performance of the XJ750 is HOT! Recently, Yamaha USA employed pro drag racer "Pee Wee" Gleason to show just how hot. In a run scrutinised by motorcycle association officials and press, Gleason took the XJ750 through the standing quarter in 11.99 seconds . . . faster than any other 750, shaft or line drive, and the first time that a 750 production bike has broken out of the 12-second bracket.

compression damping with the brake on and off feels unusable as you bounce up and down on the stationary bike. On the road, however, the anti-dive effect is much less pronounced. Many riders may not be able to discern any difference in fork action under heavy straight-line braking conditions; it's not necessarily a starting difference in those conditions because the relief valves open when hard braking generates enough pressure. The anti-dive effect is most noticeable and useful when you brake while turning and over ripply, bumpy ground; the fork compresses and the bike settles down gradually, so you worry less about losing ground clearance, and it's easier to make steering corrections if necessary. There's also plenty of travel avail-

able—a blessing in rough corners.

The amount of anti-dive effect is variable with Yamaha's particular system; the bottom of each bolted-on anti-dive unit features an indexed adjuster protected by a rubber cap. The adjuster bolt varies the amount of spring preload on the anti-dive valve piston to change the amount of anti-dive resistance. The entire range of adjustment is useful; settings vary according to the riding conditions. The number four position (one step from maximum) works well for hard back-road riding, one or two works better for less demanding one- or two-up cruising, and position five suits a fully loaded and faired bike. The anti-dive system adds little weight to the fork, and its benefits more than offset any pen-

alty in unsprung weight.

The Seca's suspension components are adjustable in other ways as well. Each fork leg is pressurized with air through a collar mounted below the top clamp, which takes the place of the more common air caps. The air fittings are not joined; you must check and adjust each leg separately. But since the air valves are easily accessible, it's a less burdensome chore than it might be. The recommended standard setting of 5.7 psi works well for cruising, and 16 psi helps your stability when hard charging. The recommended maximum of 36 psi is useless for

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YAMAHA 750 SECA

all but masochists. The stiction level is low in the fork, and damping action is good with the stock 20-weight fork oil.

The XJ750 uses a two-shock rear suspension system. A four-position adjusting dial resides at the top of the shock; position one yields the lowest damping rate, number four the highest. Each step is spaced well enough to produce useful changes, and the entire range is wide enough to satisfy most riders under most conditions. Yamaha considers number one the standard setting; *Cycle's* testers used that setting for freeway cruising. For canyon riding we used positions three and four, depending on rider weight and aggressiveness. Spring preload adjusts to one of five settings with the standard ramp-collar arrangement. The collar, with only one lug for adjusting, is awkward to use at times, and the upswept exhaust pipes sometimes get in the way.

Overall, the suspension components give the Seca a sporty, taut feel. Slighter testers (140 pounds) thought the XJ's ride bordered on being harsh even with everything dialed down to "full soft." And although all testers agree that the Seca doesn't set any new records for touring comfort, all think the sacrifice is worthwhile because the Seca works so well on mountain roads.

The Seca isn't just a good-handling shaft bike; that backhanded compliment often implies that sport-oriented drive-shaft motorcycles are inherently inferior to chain-driven sport types. On the XJ, Yamaha has successfully controlled the pronounced up-and-down torque reaction that plagues so many shaft-driven bikes. The Seca's rear end never bobs annoyingly, and changes in throttle openings usually produce no noticeable torque reaction at all. The most notable feedback occurs during full-throttle shifts; a kick through the seat reminds you that you are indeed riding a shaftie. Overall, though, there are no bothersome shaft-drive effects.

The Yamaha feels compact and light for a 750, and the numbers support these impressions. The XJ has a 56.9-inch wheelbase, 28 degrees of rake and 4.49 inches of trail, figures that suggest quicker handling than those for the Honda and Suzuki 750s, yet not as quick as the cat-like Kawasaki KZ750. Tipping the scales at 521.5 pounds fully gassed, the Yamaha weighs in at the same relative position; it's 20 to 30 pounds lighter than the Honda and Suzuki and 25 pounds heavier than the KZ. In actual use, the Seca steers precisely and lightly without being too quick; the bike never gets twitchy, even at 100-mph-plus speeds.

Lack of ground clearance with the Seca can disconcert hard-core go-fasters. With many bikes, riders can use the footpegs as lean indicators in corners and drag them along harmlessly like out-

riggers. Not so the Seca. Yamaha carefully tucked the short, beveled pegs in close to the bike, and their warning is real: solid objects touch ground immediately after the pegs hit—the sidestand drags on the left side; the brake pedal, centerstand, pipe-junction shield and head pipe grind on the right. During one photo session, enough pieces dragged in a fast, right-hand sweeper to unload the rear end momentarily, sending the bike into a slide. The Seca never tried to high-side the rider and it reacted and steered predictably, but that's not the type of thing you want to practice regularly.

For hard-charging riders the extremely short pegs also increase boot-scraping in corners. We realize that many riders like to drag the outboard side of their shoes to gauge lean angle and that the café crowd proudly displays beveled boots as a badge of courage; the Seca, however, forces its rider to move his feet back on the peg or turn them sideways and move them in.

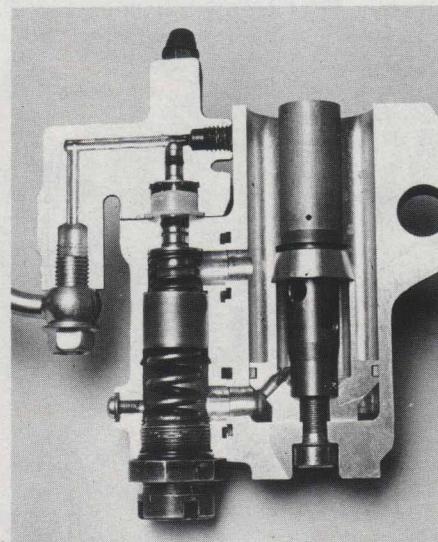
The Seca's limited ground clearance (indeed, 99th-percentile riders call it a problem) is in part due to the low seat

height. The seat is only 30.8 inches off the ground, which makes it easy to walk the Seca around or support it at a stop. More than an inch lower than the two larger 750s', the Seca's seat gives up more than an inch of ground clearance in comparison. All other factors being equal, a bike with a longer wheelbase needs more ground clearance because it must be heeled over farther at a given speed through a corner; so the difference can be rationalized in part. However, Yamaha engineers have sought a low seat height at the sake of some ground clearance compared also to Kawasaki's KZ750: the Seca has a half-inch-lower seat, a half-inch less ground clearance—and a one-inch-longer wheelbase.

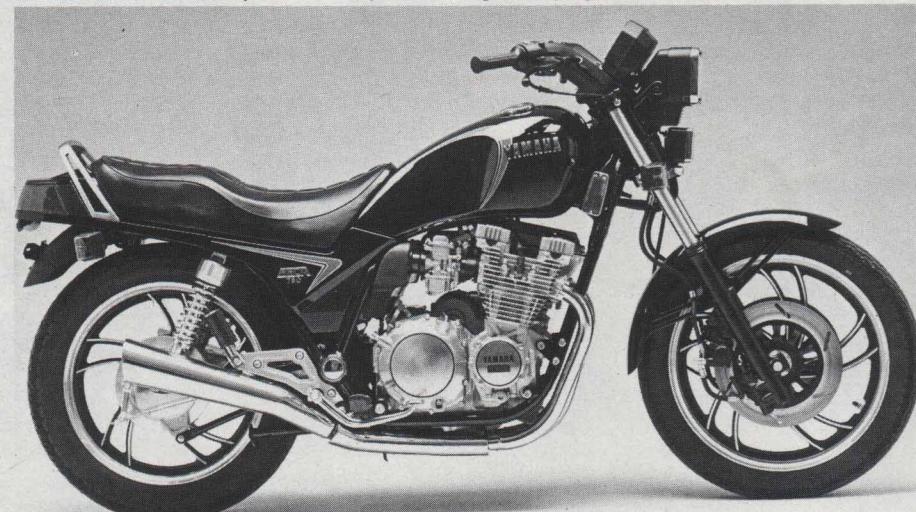
The Seca's brakes, though good, are not excellent. Although the front dual discs provide plenty of stopping power, actuation feels spongy and vague, which makes it difficult to modulate near the lock-up point. In an effort to clean up the handlebar's appearance, Yamaha designers moved the front brake cylinder to a point between the fork legs and behind the headlight shell. A heavy-gauge wire



Yamaha's anti-dive unit adds little unsprung weight and features a check-valve system that is adjustable.



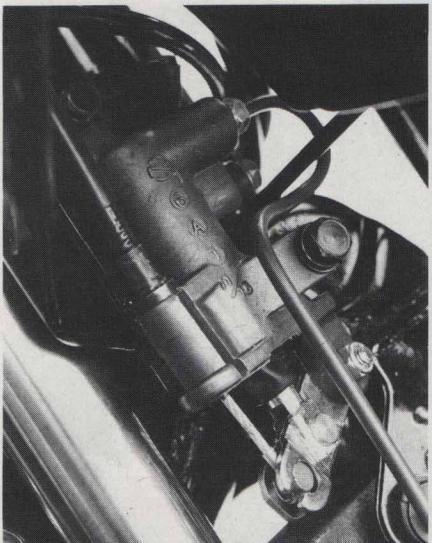
The front brake actuates a valve which then rests against a spring-loaded seat, thereby restricting oil flow.



cable connects the lever and cylinder, and we suspect this is where the feel is lost. One advantage to the cable system is that the rider can adjust the front brake at the lever, something that can't be done with most front disc brake systems. However, we'd gladly trade a cluttered bar and a lever that's not adjustable for precise brake feel. The rear brake is a single-leading-shoe drum; its stopping power is adequate, but the brake is subject to fade, and it too lacks truly precise feel.

Yamaha had already introduced two totally new engines in their 650 Maxim and 550 Seca, so we were not surprised to see a familiar-looking engine in the big Seca. Yamaha derived the 750's engine from the Maxim 650 unit, and we like that because we consider the engine the best part of the Maxim. Using one basic powerplant for more than one displacement makes a lot of sense; design, development and production costs can be amortized over several models, thereby realizing a savings that can be passed on to the consumer.

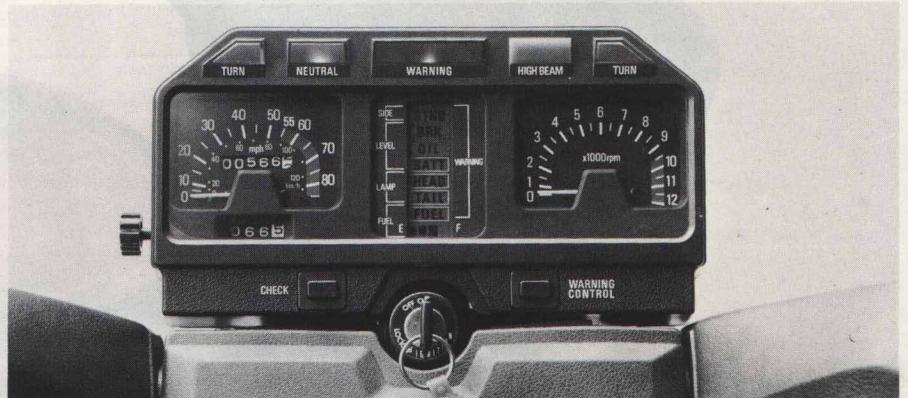
The Seca's cases, clutch and power train are identical to the Maxim's, includ-



The front brake cylinder is hidden behind the headlight. Unfortunately, brake feel got lost in the move.

INSIDE THE
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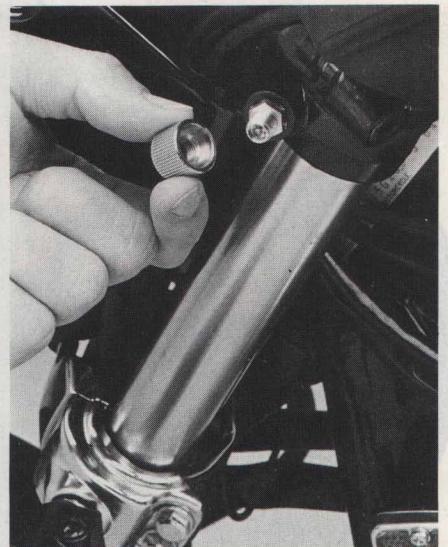
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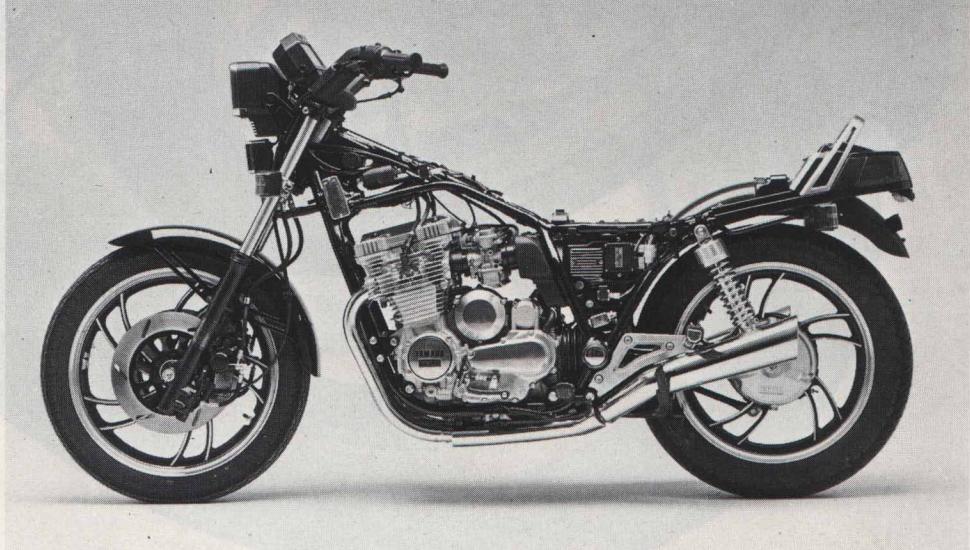
A microcomputer monitors seven areas and warns the rider of any potential problems with an LCD display.



Stiff springs and useful four-way adjustable dampers give the Seca rear end a taut but controlled ride.

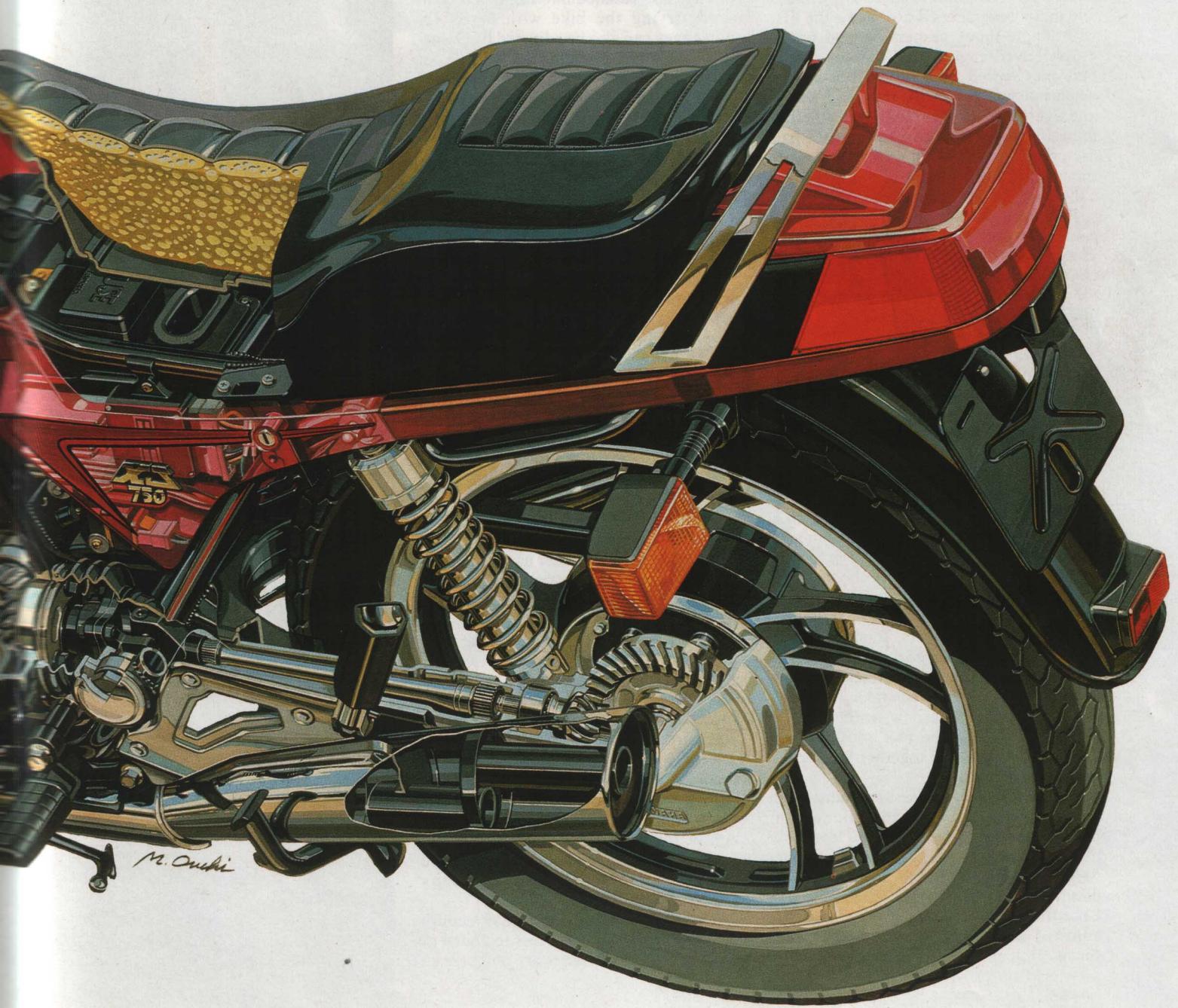


The air-assisted fork lacks a crossover tube but the collar-mounted valves provide convenient access.





INSIDE THE XJ750



YAMAHA 750 SECA

ing all gear ratios from the large primary-drive spur gears down to the shaft final drive. The XJ750 features the Maxim's unusual engine-narrowing layout, which places the alternator and starter behind the crankshaft. The crank drives the alternator through a strong Hy-Vo chain, and the starter motor spins the engine through the alternator via spur gears and a one-way clutch.

Although the 750's cylinder assembly is the same height as the Maxim's, Yamaha increased the Seca's stroke four millimeters. This figure, along with a two-millimeter increase in bore diameter, accounts for the displacement jump from 653 to 748cc. There is still room for additional bore increases; should future plans dictate, the 750 engine could be boosted to about 900cc with no further stroke increase. Yamaha engineers flattened the 750's piston crown to retain the 9.2:1 compression ratio; the 28mm exhaust and 33mm intake valve diameters remain unchanged from the Maxim's.

The 750's intake system differs from

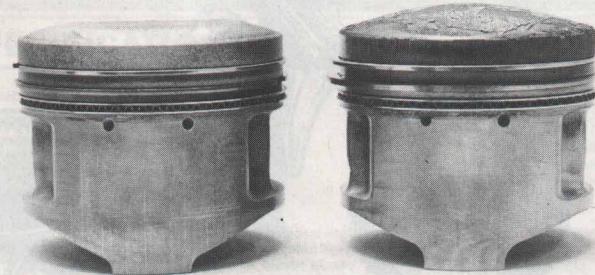
the 650's by incorporating some of the new technology introduced on the 550 Seca we tested in February. The 750 features the Yamaha Induction Control System (YICS) the factory developed in an effort to improve fuel economy. The YICS uses a system of interconnected sub-intake ports that sends a swirling charge into each combustion chamber to enhance fuel-air turbulence, thereby improving burning efficiency. As was the case with the 550, the 750's mileage figures were good, if not overwhelmingly superior; only back-to-back testing with the competition will tell for sure. We averaged 43.8 miles per gallon, slightly better than the mileage we recorded with other 750s. With the Seca's five-gallon fuel capacity, it takes you about 219 miles before you run dry.

Rather than the Maxim's 32mm carburetors, the 750 wears 28mm Hitachi constant-velocity units like those on the 550 Seca. A Yamaha spokesperson ventured that the YICS affects induction more than displacement affects induction—hence the smaller carbs. Though the carbs are smaller than average for

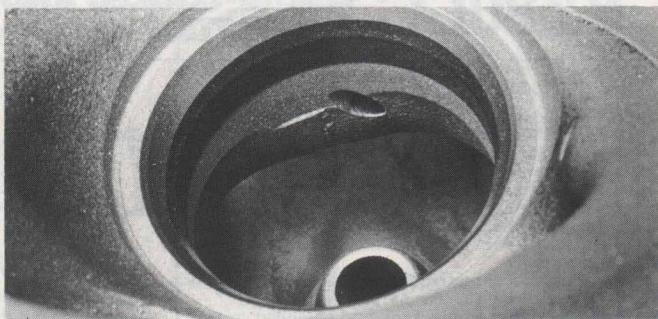
current 750 fours, the Seca's performance does not suffer.

The XJ requires only a brief warm-up session. The "choke" lever is mounted on the left handlebar for convenient access, and the 750 runs willingly on part choke, displaying none of the hesitation and staggers common to so many of today's lean-running machines. The engine pulls smoothly and willingly from just off idle; rolling on the gas at an incredibly low 1000 rpm in fifth gear with a 300-pound load produces nary a cough or stumble. The Seca pulls well through the entire rev range, but the fat portion of the powerband lies from 7000 rpm to the 9500-rpm redline.

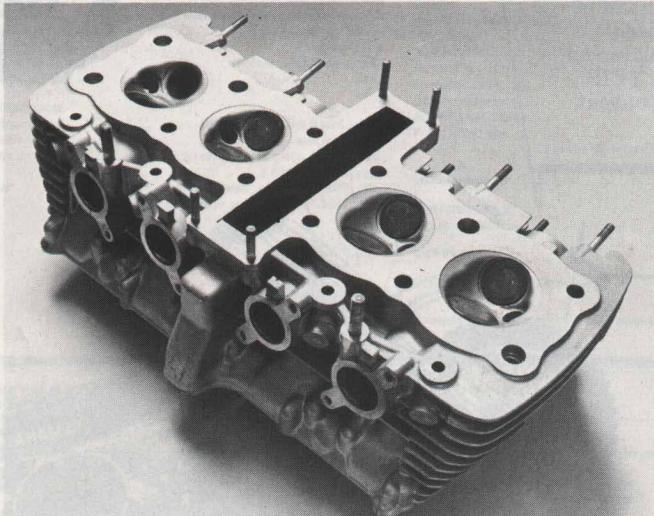
We staged some roll-on contests against a Suzuki 750 and found some mildly surprising results. The Seca pulled out a small edge and held it when we started at low-end and mid-range engine speeds, and the Suzuki pulled out a small advantage and held it during high-rpm comparisons. The Seca's smaller carb size clearly helped engine response at low-rpm levels. Otherwise, the two bikes were matched fairly evenly in power. The



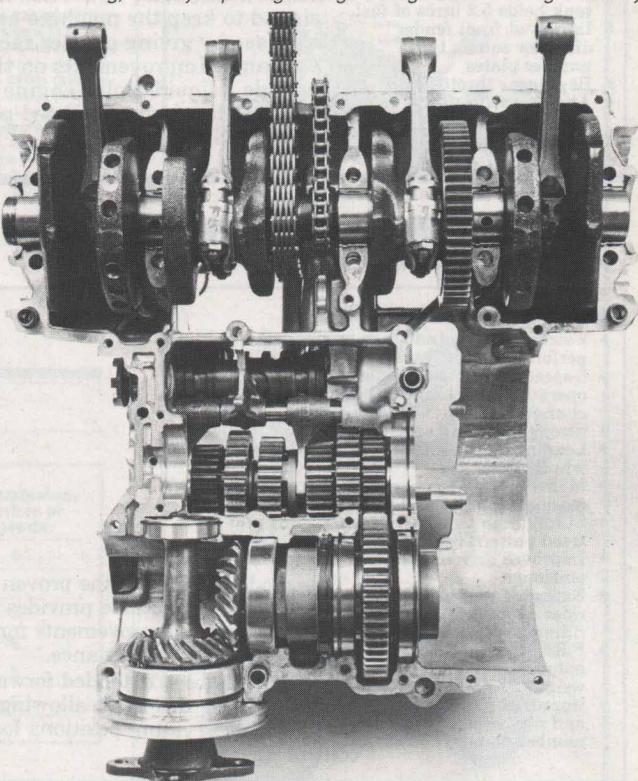
The 750 Seca piston is two millimeters larger in diameter than the 650 Maxim slug. It has a wider skirt for increased thrust area and a greatly reduced crown height.



The small, angled YICS sub-intake port swirls the incoming fuel charge to enhance air/fuel mixing, thereby improving mileage through better burning efficiency.



The Seca powerplant is based on the 650 Maxim engine; stud centers, bore centers, valve diameters, cases and gearboxes are identical. In the photo on the right the input shaft has been removed to show the staggered gear clusters.



YAMAHA 750 SECA

Seca's respectable drag-strip time of 12.49 seconds at 104.89 mph reflects this parity, especially considering that the shaft drive makes the XJ prone to wheel-spin when getting off the line. Overall, at the dragstrip or in a backroad contest, the outcome depends as much on rider expertise as on horsepower.

The Seca's strong engine runs less smoothly than the Suzuki 750 or the kindred Yamaha 550 and 650 fours. The XJ750 starts out smoothly, but it sends a

noticeable tingle through the handlebar at 4500 rpm, which works out to 60 mph in top gear. From 4500 rpm on, bands of vibration rise and fall in intensity while the buzz travels from handlebar to seat to tank to footpegs. After a long stint in the saddle, the most noticeable aftereffect is a light tingling sensation in the hands. The vibration never becomes troublesome, but on a long trip it can be mildly irritating.

Our testers rated the riding position on the Seca 750 as good to excellent, depending on the rider's size. The seating layout positions the rider in a mild café

racer crouch; the rearset pegs, contoured seat and relatively low handlebar set the rider forward, leaning slightly into the wind for support. Our under-six-foot testers found the seating position ideal; our taller riders said they would prefer a flatter bar with slightly less pullback. The cupped seat also prevented our longer-legged riders from sliding backward, adding to that slightly cramped feeling. Still, all testers strongly preferred the Seca's riding position over any cruiser or standard-style motorcycle. Passengers

Cycle **Test Specifications** **YAMAHA XJ750RH SECA**

Make and model	Yamaha XJ750RH
Price, suggested retail (as of 3/26/81)	\$3199
PERFORMANCE	
Standing start 1/4-mile	12.49 @ 104.89
Engine rpm @ 60 mph, top gear	4499
Average fuel consumption rate	43.8 mpg
Cruising range, main/reserve	171/48.0
Load capacity (GVWR less curb weight).....	217.1 kg (478.5 lbs.)
Maximum speed in gears @ engine redline	(1) 47.1 (2) 68.7 (3) 89.3 (4) 110.4 (5) 126.7

ENGINE

Type	Four-stroke, transverse four, air-cooled with two overhead cams, chain-driven
Bore and stroke	65.0 x 56.4mm (2.56 x 2.22 in.)
Piston displacement	748cc (45.6 cu. in.)
Compression ratio	9.2:1
Carburetion.....	(4) Hitachi 28mm constant velocity
Exhaust system	Four into two
Ignition	Battery-powered, inductive, magnetically triggered
Air filtration	Paper element, disposable
Oil capacity	3.5 liters (3.7 qts.)

TRANSMISSION

Type	Five-speed, constant-mesh, wet clutch
Primary drive	Spur gear, 1.67:1
Final drive	Shaft and helical-bevel gear, 4.18:1
Gear ratios (overall)	(1) 15.29 (2) 10.48 (3) 8.06 (4) 6.52 (5) 5.68

CHASSIS

Type	Twin-downtube, full cradle frame
Suspension, front	Leading-axle, coil/air-spring fork with 144mm of travel
rear	Swing arm with (2) dampers adjustable for preload and damping yielding 90mm of travel

Wheelbase	1445mm (56.9 in.)
Rake/trail	28° / 114mm (4.49 in.)
Brake, front	Hydraulic, dual-disc, 298mm (11.7 in.) rotor, with single-piston caliper
rear	Rod-actuated drum
Wheel, front	Cast, 19 x 1.85
rear	Cast, 18 x 2.15
Tire, front	3.25 H 19 Bridgestone Mag Mopus-L303
rear	120/90-18 65H Bridgestone Mag Mopus-S716
Seat height	782mm (30.8 in.)
Ground clearance	138mm (5.4 in.)
Fuel capacity	14.9/4.1 liters (3.9/1.1 gal.)
Curb weight, full tank	263.5 kg (521.5 lbs.)
Test weight	309.1 kg (681.5 lbs.)

ELECTRICAL

Power source	Three-phase alternator
Charge control	Solid-state voltage regulator
Headlight beams, high/low	60/55 watts
Tail/stop lights	8/27 watts
Battery	12V 14 AH

INSTRUMENTS

Includes	Speedometer, odometer, tripmeter, tachometer with 9500-rpm redline, fuel gauge.
	Indicators for high beam, turn signals, neutral, sidestand extended, burned-out headlight or taillight, low oil, battery and fuel levels.

Speedometer error,

30 mph indicated, actual	29.13
60 mph indicated, actual	58.93

CUSTOMER SERVICE CONTACT

Customer Relations Department
Yamaha Motor Corporation, USA
6555 Katella Avenue
Cypress, California 90630
(714) 761-7439

PRIDE AND PREJUDICE

The 'joys' of owning a British lightweight

When I was seventeen I bought my first motorbike. It was a secondhand B.S.A. Bantam which cost me forty pounds. I didn't know anything about bikes but I needed a cheap form of transport. I was assured by my brother and dad that a simple British two-stroke bike wouldn't give me any trouble and would be perfect for my needs.

Who was I to argue? Dad had been a dispatch rider during the war and since then had had a series of B.S.A.'s, A.J.S.'s and Matchlesses. Brother Brian had inherited the mechanical genes and had been tinkering around with rusty heaps of metal ever since I could remember.

They came and chose the bike with me and the moment we got it home began to strip it down. This was the wonderful thing about solid, honest British bikes: they positively invited you to take them apart. Oil-sodden rags, frayed tempers, lost ball-bearings, freezing cold nights in the garage and the smell of 'Swarfega' hanging over the house were part and parcel of owning a 'real' motorbike.

Of course, those "Japanese upstarts" just coming on to the market didn't count. In fact, it was rumoured that the kids who were buying them could actually be seen riding the things at weekends when every decent British bike was where a bike belonged—in bits in the garage.

I didn't question the sense of this judgment even after I'd been back to riding the bus more than a few times in the first couple of months when the bike's clutch had gone again or the lights had packed up. At least, dad was getting a lot of fun playing around with the bike, and the oil leak from the crankcase wasn't too annoying unless you were wearing your best shoes.



To be honest, I was rather proud of having grime under my fingernails. It made you feel superior not to have been taken in by all that flashy chromium plating.

After struggling on with the Bantam for a few years, I progressed to a two-stroke Francis Barnett which Brian had resurrected from the scrap heap. There was no denying it was a lovely bike. Even in the 1960s it was a curiosity which aroused interest whenever I rode it. It was a shame I didn't get to ride it more often, really. But I was used, by then, to the regular overhauls that British classics needed.

When I moved away from home I left it behind me because I didn't have the skill, facilities or time to keep it on the road. And anyway, I'd become fed up with being late for work and always smelling of oil. I was quite upset then, when, a few years later, my wife got a job where she needed our car. My heart sank at the prospect of a return to my motorbiking days.

I happened to confess these feelings to a sixth form student of mine who came to school on a motorbike. I was surprised that he didn't seem to know what I was talking about. I glanced at his fingernails and was shocked to see that they were clean. On further questioning it turned out that he'd never ridden a British bike!

Suddenly, a lifetime's ingrained prejudice began to slip away. A previously unthinkable idea began to take shape. I wondered how they'd take the betrayal at home, but I didn't care. Secretly, I'd always felt envious of all that chrome. I swallowed hard. "What sort of bike have you got, then?"

"Yamaha RS100" was the reply, and the die was cast!

Yamaha Seca Continued

have adequate if not spacious seating, and the raised grab rail provides a sure handhold.

The rearset shift linkage does not hamper gear changes at all. The Seca shifts cleanly and positively; missed shifts and false neutrals are rare. The gearbox ratios are spread well, even though they also suit the less powerful XJ650. The one fault, an excessive amount of driveline snatch (not to be confused with the typical torque reaction of most shaft-drive bikes), causes fits of lurching and jerking in stop-and-go and in-town riding.

The Seca's lighting is excellent: the quartz-halogen headlight throws a broad, bright beam, and an auxiliary 35-watt quartz "driving light" throws a separate spot of light. In addition to the normal indicators, the 750 features a "computerized monitor system." The system uses a liquid crystal diode (LCD) display to warn the rider of any potentially dangerous conditions the motorcycle develops, including: sidestand extended, low levels of brake fluid, engine oil, battery acid or fuel; and a burned-out headlight or taillight. The system includes also a bar graph-type fuel gauge that reads fairly proportionally. The control system runs down this LCD checklist when you first start the engine, and constantly monitors these areas while you ride. Manual controls allow you to check the system at any time, and an override system lets you cancel the flashing warning light.

We had an opportunity to check some of these warning indicators, and the computer passed along the correct warning. The system is functional since it keeps track of most of the elements likely to cause problems for motorcyclists. It also appealed to some of our testers because it's a flashy bit of technology, even if it is a gimmick.

And so it is with the Seca itself. It's functionally sound and flashy—that's how it faces the stiff competition in the 750 class. And although Yamaha imposed some key designs—such as the remote front brake cylinder and low seat height—despite their impact on function, the XJ750 works very well as a sport bike. The Seca also succeeds because it has innovative features; the anti-dive braking is a major advance in motorcycling technology.

But don't fool yourself into thinking that innovations come free. At \$3199, the Seca costs \$300 more than the Kawasaki 750 and \$200 more than the Honda and Suzuki options, significant differences in price. However, when you are spending money at the three-grand level, two or three hundred bucks probably won't stop you from getting exactly what you want. If you're looking for the newest, flashiest and most functionally innovative 750 sport bike around, you'll have to choose the Yamaha Seca 750. ◉

—Robert Hubbleday